DOCUMENT RESUME

ED 301 920 EA 020 263

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TITLE Cognitive Flexibility and Inflexibility in Principals' Problem Solving.
PUB DATE Apr 88
NOTE 28p.; Paper presented at the Annual Meeting of the American Educational Research Association (New Orleans, LA, April 5-9, 1988).
PUB TYPE Reports - Evaluative/Feasibility (142) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Administrator Attitudes; *Cognitive Style; Decision Making; Elementary Education; *Principals; *Problem Solving
IDENTIFIERS *Flexibility (Attitude)

ABSTRACT

While researchers can describe how some effective principals perform in some situations, little is known about what shapes their practice and what meaning they find in such practice. This report is part of a larger series exploring principals' problem-solving strategies and thought processes. This paper examines one problem-solving dimension (flexibility) as related to relatively unstructured and messy problems. The hypotheses were that (1) principals' problem-solving would demonstrate many of the same flexibility and inflexibility attributes found in problem-solving used by workers in other domains; and (2) principals demonstrating overt practices judged as highly effective would demonstrate greater problem-solving flexibility than their less effective peers. The study interviewed 22 elementary school principals (1 female, 21 male) in subsets over a 2-year period; 6 were designated as "expert" by the principals' own boards and through extensive interviewing. Results showed that several inferential "errors" (or inflexibilities) influenced by cognitive factors were made, including overweighting vividness or importance, generalizing from a small or biased sample, and overuse and misuse of theories. Inflexibility asociated with motivational influences or the principals' mood were also common. Among certain principals, there was strong evidence of cognitive flexibility, expressed in "opportunistic" planning approaches to problem-solving. "Expert" principals avoided errors, controlled their moods, and responded to opportunities in the situation. Non-experts made errors, were unable to control their moods, and were less opportunistic in the problem setting. Included are a table summarizing inflexibility and flexibility elements and 18 references. (MLH)

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Cognitive Flexibility and Inflexibility in Principals' Problem Solving

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Paper presented at the Annual Meeting of the American Educational Research Association, New Orleans, April 1988.

EA 020263

Cognitive Flexibility and Inflexibility in Principals' Problem Solving[1]

Contemporary studies of what principals do and descriptions of highly effective practice have contributed substantially to the knowledge base required for school improvement. But while we are now better able to describe what some effective principals do in some situations, we know practically nothing about how they come to act as they do. What is it that shapes their practice and what meaning do they find in such practice? Until these questions are addressed, our ability to assist principals in becoming more effective will be severely restricted.

Research reported in this paper is part of a larger series of studies exploring the problem-solving strategies and thought processes of principals. This series is in the tradition of problem-solving research based on information processing theory and is aimed at clarifying differences between expert and non-expert principals in a variety of problem domains. Building on the findings of two directly preceding studies (Leithwood & Stager, 1986, 1987), this paper reports the results of examining one dimension of problem solving, flexibility. For purposes of this study, the attributes of flexibility in principals' problem solving were defined on the basis of research carried out in other domains characterized by relatively unstructured and messy problems. Our hypotheses were that (1) principals' problem solving would demonstrate many of the same attributes of flexibility and inflexibility found in the problem solving of those working in other domains and (2) principals demonstrating overt practices judged to be highly effective would demonstrate greater flexibility in their problem solving than would their less effective peers.

The choice of flexibility in problem solving as a focus for this study emerged from our

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[1]This research was supported by grants from the Social Sciences and Humanities Research Council of Canada and from the Ontario Ministry of Education

prior explorations of principals' problem solving. Most recently we identified five components of principals' problem solving in which there were differences between experts and non-experts. One component, "interpretation", was concerned with differences between experts and non-experts in the way they understood the nature of a problem or made sense of a problematic situation. These differences were particularly marked for problems that were relatively unstructured, "messy", or concerned with "indeterminate zones of practice" (Schön, 1987). In the search for conceptual tools to better understand these findings, Showers and Cantor's (1985) conception of social cognition appeared to have considerable utility. Attributes which they associated with "flexibility" in social cognition were important dimensions of variation in the problem-solving processes of experts and non-experts in a variety of domains. Differences within certain elements of motivation appeared to provide plausible reasons for such variations in flexibility. Our data also suggested that expert principals were more cognitively flexible than less expert principals.

Similar conclusions about the importance of flexibility in problem solving have been reached independently by those working in a variety of fields (e.g., Bolman & Deal, 1984; Glasman, 1986; Perkins, 1986; Scribner, 1986) . The component of problem solving which we labelled "interpretation" (and others variously term "problem formulation", "problem clarification", and so on) is more important, relative to the choice-making or decision-making part of the problem-solving process, than has been realized until recently. In addition, they suggest that flexibility consitututes an important element of variation among problem solvers.

For example, Scribner (1986) , writing in a volume on practical intelligence, claims:

> Skilled practical thinking involves problem formation as well as problem solution. Models of formal problem solving suggest that problems are "given" and intellectual work consists of selecting and executing a series of steps that will lead to a solution...by contrast [our] studies suggest that expertise in practical problem solving frequently hinges on an apt formulation or redefinition of the initial problem.(p. 21)

Scribner points out that flexibility in meeting changing conditions and what Schön (1983) terms "informal improvisation" are well-documented aspects of practical intellect and suggests:

> Practical problem solving is an open system that includes the components lying outside the formal problem--objects and information in the environment and goals and interests of the problem solver. Expertise in practical thinking involves the accomplishment of a fitting relationship among these elements, an accomplishment aptly characterized as functionally adaptive. Beneath the surface of adaptation, however, lie continuing acts of creativity--the invention of new ways of handling old and new problems.(p. 28)

Glasman (1986), discussing the role of judgment in evaluation by principals he has studied, points out:

> Evaluation, judgment rendering, and flexibility all play a role....The value of focusing on flexibility in judgment rendering should not be mysterious. After all, flexibility is required whenever there is uncertainty. What may be new to students of school leadership is that the work which Bruner and Simon began continues until this day, and its focus in cognitive psychology is on judgment research (e.g., Kahneman, Slovic, and Tversky, 1982)....Current cognitive psychologists who work on judgment rather than choice are sending the message that judgment under uncertainty is central. It is high time that students of school administration admit it too, and set out to examine it rather than be ashamed of it.(p. 167)

Because the concept of cognitive flexibility seemed so promising when used to interpret the results of our previous research, and because the idea of flexibility has been identified as such an important one in other domains, we decided to examine a much larger and more varied data set for evidence that cognitive flexibility was involved in differences in competencies in problem solving. Our particular interests were (1) in describing the nature of cognitive flexibility and of its inflexible opposite, and (2) in understanding the factors which influence these.

Framework

Showers and Cantor's (1985) framework (Figure 1) was used for data analysis. It identifies sources of motivation (goals, moods, and expertise) and shows their relationship to a person's actions, mediated by certain characteristics of thought. Showers and Cantor believe that personal goals, mood states, and amount of prior

relevant knowledge or expertise guide individuals' interpretations of a situation and their plans for how to respond.

Motivational Elements ⟶ Flexible Cognitive Strategies ⟶ "Appropriate" Action

-Goals	-Responsiveness to situations
-Mood	-Active control
-Expertise	-Multiple interpretations
	-Change in repertoire

Figure 1: Showers and Cantor's (1985) Explanation of the Relationship Between Sources of Motivation and Problem Solving

Furthermore, they claim, under some circumstances:

> ...people show flexibility in (a) adjusting interpretations in response to situational features; (b) taking control of their thoughts and plans; (c) seeing multiple alternatives for interpreting the same event or outcome; and (d) changing their own knowledge repertoire by adding new experiences and by reworking cherished beliefs, values, and goals.(p. 277)

Under other circumstances, people display inflexibility. As Showers and Cantor indicate, the bulk of the evidence from research on social cognition demonstrates more passive, less flexible ways in which prior knowledge contributes to present interpretations and strategies. The inflexible practices corresponding to the four elements of flexibility listed above are: (a) tending to cling to favorite interpretations, and not be responsive to situations; (b) exercising little active control over moods, self-defeating cognitions, and dysfunctional strategies; (c) being trapped by perceptually salient and cognitively available stimuli; and (d) having schemas and stereotypes in one's knowledge repertoire that are resistant to change.

In applying the Showers and Cantor framework, we decided to concentrate only on the first three elements of flexibility and inflexibility, because the fourth was concerned with a time frame too lengthy to capture in our study. In addition, although we used the terms "goals" and "moods" in the manner of Showers and Cantor (1985), we took a somewhat different approach to the role of "expertise" or knowledge, the third

motivational element considered by these authors. In their view, expertise is "an especially fuzzy concept", and it is defined differently in their work and ours.

Apart from the work of Showers and Cantor, our approach to data analysis was also guided by the work of Nisbett and Ross (1980). Their results relate particularly to the matter of knowledge and were particularly applicable to the third aspect of inflexibility, "being trapped by perceptually salient and cognitively available stimuli".

In contrast to the motivational approach taken by Showers and Cantor, these authors were concerned with imperfections in human judgment which they attribute primarily to intellectual or informational causes. Nisbett and Ross do not deny the importance of emotion and motivation in situations where human judgment and behavior is imperfectly rational, but they believe that such constructs have been too readily invoked to explain errors or failures of rationality. Inferential or judgmental failures are "cut from the same cloth" as inferential successes. Certain strategies are well adapted to deal with a wide range of problem situations, but become a liability when applied beyond that range, and especially when applied to problems which require some understanding of the normative principles that guide the professional scientist's formal inferences.

There are two general sorts of tools that people use in interpreting situations, or in making inferences about them by "going beyond the information given". The first sort of tool, much studied by Kahneman, Slovic and Tversky (1982), involves using two judgmental heuristics to make inferences. The availability heuristic, used to judge the frequency and likelihood of events and event-relations, can sometimes lead to error because of biases at the stages of sampling, encoding, and retrieval. The representativeness heuristic is used to estimate the likelihood of some state of affairs given knowledge of some other state of affairs, for example, the likelihood that an object is a member of some category because it has certain characteristics. Such judgments are based on the perceived similarity of known object characteristics to the essential characteristics of the category. This heuristic can mislead in circumstances where mere

similarity is an unreliable guide to likelihood.

The other sort of tools to be used besides heuristics are knowledge structures; these include relatively propositional structures such as theories and beliefs, as well as more schematic structures such as scripts and personae. These knowledge structures, while often valuable, can mislead to the extent that they are poor representations of external reality and to the extent that they preclude attention to the details of the actual object or situation at hand.

It is possible that the judgmental heuristics may be the primary determinants of the arousal and application of the various knowledge structures. In any case, it is not the existence of heuristics and knowledge structures that can be considered as error-producing, but rather their overuse, misuse and use in preference to more appropriate strategies. Nisbett and Ross' book provides a variety of illustrations of the types of errors that can be made because of inappropriate applications of these cognitive strategies.

Their work, in combination with that of Showers and Cantor, provided us with a set of categories for recognizing instances of cognitive flexibility and inflexibility, as well as suggestions regarding the cognitive and motivational factors which may influence these.

Method

Sample

Twenty-two elementary school principals (1 female, 21 male) from three boards of education took part in the interviews on which the analysis presented here is based. As in previous work (Leithwood & Stager, 1987), 6 of the 22 principals were designated as "expert" on the basis of two criteria. First, independent judgments were made by two senior administrators in the principals' own boards that these were "highly effective" school administrators. Second, all principals were given an extensive interview, keyed to a four-stage, research-based conception of growth in principal effectiveness (The

Principal Profile. Leithwood & Montgomery, 1986). Those principals rated highly on the Profile (as well as being judged highly effective by both board administrators) were considered "experts". The remaining 16 principals were considered as "non-experts" in analysing results.

At the beginning of data collection, the 6 experts had an average of 15 years of experience in school administration, while the remaining 16 principals had an average of 17 years of experience. The experts' schools had an average of 506 students, and 4 of these schools had vice-principals. The remaining principals' schools had an average of 350 students, and 5 of them had vice-principals.

Data Collection Procedures

Interview data were collected over a two-year period. The first interview in Year 1 requested that all principals perform a problem sorting task and then reflect on their own problem solving and the factors influencing it. The general focus in this interview was on principals' opinions about their own problem solving. (See Leithwood and Stager, 1986, for results.)

The second interview in Year 1 explored differences in problem solving associated with variations in problem structure. All principals were asked to rank a set of brief case problems in terms of how clear, at the outset, the course of action to be taken was. Then they were requested to provide detailed solutions to two of these hypothetical cases (the most and least "clear" or "structured" ones). Finally, they were asked to describe two problems from their own experiences which were similar in degree of clarity or structure to each of the hypothetical problems.

In the second year, a subset of 11 of the original 22 principals was chosen (5 of these from among the original group of 6 "experts", and 6 of these from among the original group of 16 "non-experts") to participate in interviews concerning their problem solving in group situations. For 6 principals, both a small- and a large-group situation was investigated; for the remaining 5, only one (small or large) meeting situation was

studied. In each case, a brief "pre-interview" was conducted with the principal prior to a meeting situation; the researcher inquired about expectations and plans with respect to a problem selected by the principal, for the meeting. Then the principal taped, in the researcher's absence, the group session in which the problem was considered. Finally, using a "stimulated recall" technique, the researcher and principal listened together to the group meeting tape. The tape was stopped whenever the principal wished to comment on, or the researcher wanted to ask about, the principal's problem solving; their remarks were taped on a second tape recorder.

Data Analysis Procedures

Transcripts were prepared for the 44 interviews conducted in the first year, and for the pre-interview and stimulated recall portions of the 17 sessions conducted in the second year. Results reported in this paper are based on the analysis of these transcripts, along with the audiotapes of the meeting sessions.

The specific data examined included: principals' opinions about their own problem solving; observed solutions to hypothetical case problems; solutions, as remembered and described by principals, to actual problems they had encountered; principals' interpretations of and comments on their problem solving in group situations; and observations of principals in group problem-solving situations. Given our research purposes, any one of these categories of data, taken alone, has certain limitations. Relying only on solutions to hypothetical case problems would prevent our understanding how principals clarify and interpret complex problems. As another example, there may be marked differences among principals in their willingness to recount the actual past situations in which they have been less than successful, and even in their ability to remember such situations. However, the triangulation of a variety of methods allowed us to search for patterns common across various types of data and helped to compensate for these potential limitations. However, because the possibilities of bias in the data were still sufficiently strong, the analysis was primarily concerned with identifying instances of flexibility and inflexibility per se and only secondarily with a comparison

between experts and non-experts.

We began the analysis of this large set of data by defining several categories of plausible cognitive or inferential errors (Nisbett & Ross, 1980). This choice was based on considerable experience with our data as well as a careful reading of Showers and Cantor (1985) and Nisbett and Ross. These errors included:

- overweighting vividness: situations in which principals' judgments appeared to be unduly influenced by the vividness and/or emotional interest of information
- generalizing from a small or biased sample: situations in which principals' judgments appeared to be influenced by a bias in sampling while collecting information
- overuse and misuse of knowledge structures: situations in which theories or schemas are depended on so heavily that principals fail to attend to details of the actual situation at hand, or where such knowledge structures are poor representations of external reality

Next, two researchers read thirty of the first year's transcripts, and noted (a) instances where these errors apparently were made and (b) instances where a "more appropriate strategy" was articulated, and the error avoided. When both researchers noted the "error" or the "more appropriate strategy", the instance was recorded. This approach follows Nisbett and Ross (1980) in dealing with the problem of determining whether inferences are "erroneous" or "correct". Correct strategies are those that (a) involve the use of a rule which formal scientists agree is appropriate in this situation or (b) for more novel situations, involve agreement among the researchers involved and, in some cases, a few colleagues. The latter judgments are necessarily considered somewhat tentative.

At this point, one researcher continued with the analysis of the remaining 14 first-year transcripts, and the transcripts and audiotapes from the 17 second-year interviews, identifying both errors and more appropriate strategies. The researcher also made note of any other instances, throughout the 61 interviews, in which principals: (a) appeared to be markedly responsive to specific aspects of the situation; (b) were clearly influenced by mood or aware of mood effects on problem solving; or (c) were clearly influenced by

goals in problem solving or aware of their effects.

The data were then summarized, first in terms of the occurrence of various instances of cognitive inflexibility and flexibility, and the apparent influences on them. Only then were differences between expert and non-expert principals examined.

Results

Results from the analysis of the 61 interviews are described in two sections. In the first and major section, the elements of inflexibility and flexibility identified for all 22 principals are presented (Table 1). In the second, very brief section, constrasts are drawn between the 6 experts and the 16 non-experts in the study.

Elements of Inflexibility and Flexibility

Errors

The first instances of cognitive flexibility and inflexibility to be described are the more "cognitive" ones, those observed when categories derived from Nisbett and Ross's (1980) work were applied. Unless noted otherwise, data reported in this and the two subsequent sections were based upon all types of interviews.

Table 1 summarizes three major categories of inferential "errors" (or inflexibility), along with the "more appropriate strategies" indicative of flexibility.

Errors in the first category, **overweighting vividness**, were made by six principals: all involved in some way making poor judgments regarding the determination of priorities among the various problems competing for their attention. In two cases, principals spent an excessive amount of their own time, at work and at home, in trying to solve an extremely difficult and intractable personal problem of a staff member. In the remaining four cases, principals set priorities in their problem solving strictly in terms of the vividness of the problems. For instance, one principal thought that the only problems needing attention were the ones that were relatively vivid or highly apparent, and stated that "I keep prioritizing. When there are no problems in the in-basket or

Table 1: Elements of Inflexibility and Flexibility

INFLEXIBILITY	FLEXIBILITY
Errors	**More Appropriate Strategies**
1. Overweighting vividness in setting priorities	• deliberate planning and priority setting • conscious perspective on role of vividness
2. Generalizing from a small or biased sample	• encourages collective work from representative group
3. Overuse and misuse of theories and schemas	
(a) Fail to see that a situation is unique or different from others in the past	• deliberate vigilance for dangers • conscious of particular features of situation
(b) Fail to determine actual causes of problem	• deliberate awareness of need to search for non-superficial causes
(c) Fail to see there are new problems facing principals	• has opinion that there are new problems and can identify some
(d) Fail to modify a single approach or strategy in light of situational features	• conscious awareness of need for variability and flexibility in strategies and roles
(e) Use theories or schemas that do not accurately represent reality	• awareness of individual differences • hold theories that encourage flexibility and openness
Uncontrolled Moods	**More Appropriate Strategies**
• fail to examine alternative courses of action • focus on own negative mood	• appropriate perspective on problem solving • conscious control of mood
Lack of Responsiveness	**More Appropriate Strategies**
• miss opportunities • fail to see other possible courses of action	• take advantage of opportunities in situation • vigilance for opportunities to meet goals particularly those related to students

walking in to my office, I go and play with the kindergartens, do this and that..."

There were several more appropriate strategies mentioned by a comparable number of principals as ways of dealing with the potential error of overweighting vividness. Some expressed the importance of deliberate planning and setting clear priorities as a way of avoiding the sort of reaction to vividness exemplified above: "I spend time on overall planning and analysis. I have learned not to jump and not to assume". Good planning also was a method used to prevent vivid crisis situations or to avoid dealing with too much emotional information: "I just quite frankly don't see a strong payoff in spending time and energy raking up these feelings..."

Some had a deliberate "bigger picture" perspective on issues that could otherwise have been seen as very vivid. From one, "this is a very poor move, and even good teachers can sometimes make a mistake", and from another, "I don't worry so much because I've found that you can blow it the odd time".

Three principals made errors of the second type, **generalizing from a small or biased sample**. Each error involved collecting information from a restricted set of those people who would have some association with a decision. In one case, the principal based his interpretation of and planning for a very innovative program on limited and biased information provided by strong advocates of the program. In another case, the principal was aware that his information was biased because he had deliberately chosen a group of only like-minded staff to work with him in setting objectives. In spite of this, he seemed unaware of the dangers of disregarding other viewpoints.

A similar number of principals indicated use of a more appropriate strategy, that of strongly encouraging collective work from a representative group of staff, as a method for avoiding such bias. About his school cabinet, one principal noted: "They speak their minds. They don't hold back and say just what they want you to hear...They come forward with information. With sharing like that, things come forward I haven't

thought of."

By far the most numerous cognitive errors displayed in the interviews had to do with the **overuse and misuse of theories and schemas**. As shown in Table 1, these are described in terms of five subcategories. Fifteen principals made two or more of these errors, with some making several. A similar number of principals mentioned, at least once, a more appropriate strategy to prevent or overcome such errors; however, only six of them exhibited such strategies, markedly.

One fairly common error of this type is **failing to see that a situation is unique or different from other similar ones encountered in the past**. In recounting difficult situations, several principals described cases where they had failed to detect dangerous features in a situation. For example, one failed to detect that a parent complaint was more serious than usual, and another failed to detect the "real" agend. of a caller.

Another variant of this error is the tendency, observed in the responses of some principals to the hypothetical case problems, to assume obstacles which are not necessarily present in a problem situation but may have been present in a similar problem encountered in the past. For instance, one principal assumed there would be "anger and hate and emotion" in a situation where several parents were requesting that their children be placed in a particular class, and that there would be "strong fear and emotion" in a situation where a principal had to enter a school where the previous principal had been very popular.

More appropriate strategies in this area included a deliberate vigilance for dangerous situations, "the ones that could blow up in your face", and a conscious awareness of the need to attend to the specifics of a situation, "...clearly listening to the situation, the problem concern, and making sure the entire professional staff understands we've got a unique situation", or "I realized this was a serious variant of a familiar problem."

A similar, but less frequent, error was **failing to determine the actual cause of a**

problem. Some of these errors, reported by principals noting that "hindsight is 20/20", concerned initial misinterpretation of others' motives in situations facing the principal, while others involved the use of superficial causal explanations.

The more appropriate strategy in this situation involved a deliberate awareness that things may not be as they seem at first. As one principal said, "It was not totally clear. It was tough to know. You often don't know if it's little stuff that is the problem, or if that's just an excuse for something major..."

It also involves awareness that it is necessary to consciously and thoroughly analyse causes at the outset of problem solving. From another principal, "The principal has to hold people back from jumping to solutions...so therefore let's analyse it and let's start looking at some causes...only then do we look at possible solutions and their ramifications."

Another source of inflexibility involves the **failure to see that there are new problems facing the principal** because overreliance on a theory or belief that there are none prevents the observation of such new problems. This attitude or opinion was expressed by some principals when they responded to a particular question, in the first interview, regarding the existence of new problems. Typical statements were: "I don't sit and think 'How am I going to handle that problem?' because I've been solving the same problem for twenty years!"; "I've never found a problem that was unclear. My steps are usually right 100% of the time"; and "No brand-new problems come to mind. I sometimes say 'I was doing this exact thing twenty years ago'."

A more appropriate strategy with regard to this matter appears to be a conscious awareness of and vigilance for the new problems that face schools and principals. Principals who realize this indicate that "there's always something new", that "there are always new problems coming up", and tend to be able to immediately back up this opinion with concrete examples.

> Although there are always some standard problems you deal with in a school...I have found that problems have changed in that they are more complex. Education has a much different profile, we are under attack much more than we were, and there is a much greater accountability factor. Due to the complexity of society today--and education can't divorce itself from it--life is more complex so education has to be more complex...I have to be more of a lawyer. I have to be more facile not just with the Education Act but with other bills that relate to that, that have an impact on that. Since knowledge is increasing at a phenomenal rate, therefore my job's changing...as curriculum changes.

Another error or source of inflexibility involving overreliance on a knowledge structure is that of **failing to modify a single approach or strategy in light of specific situational features**. Principals who do this suggest, in speaking about their own practices, that they always use a particular approach, often one that is extremely useful in many situations. However, they do not suggest that they are aware of situations in which such an approach is inappropriate. Most of the responses concerned with this matter came from questions in the first interview regarding principals' perceptions of their own styles. Some involved a very strong reliance on always staying within board policy, or on a particular approach with which the principal feels confident. For example, one principal stated: "I like to gather a lot of information up front, and I like, I love the brainstorming process. I use it all the time." Another explicitly rejected alternatives to his own commonsense strategy:

> The actual turning to a set of designed problem-solving strategies doesn't turn me on, doesn't enter into the kinds of ways I solve problems. Although I know some of them, I tend not to use it. At PD sessions, when I pick up two or three things and one contradicts the other, I tend to go back to my commonsense experiential base and it works.

More appropriate and flexible practices involve conscious awareness of the need for variability and flexibility in one's practice:

> It's important to know the people, their strengths and weaknesses...being sensitive at the time to how close to overload they are, and when to ask them to give something, and when to not, when to back off, and when to share the burden around a bit.

One principal pointed out the need to have a contingency plan because "As you get more

experienced, you realize that almost anything can happen."

Particularly in the stimulated recal interviews, some principals displayed flexibility by indicating that they were aware of the requirement for variability in the role they played in group problem solving. In some cases, this involved categorizing clearly the type of problem being considered:

> I suppose that I look at problem solving in four basic areas when it comes to presenting a decision to staff. There are the 'tell' decisions...that would just be done. There is the 'sell' type...where I would have to sell my position to staff. Then there's the 'consult' area, where I would like to consult with the staff and then let them know exactly that I'm consulting with them but I have to make the final decision. And then the final area, which is the highest level I think, are the 'share' areas, where I would outline the problem to them: here are the parameters but <u>together</u> we are going to share in the overall plan....I have openly told my staff that if they see me confusing the terms, blow the whistle and let me know...

In other cases, it involved changing one's role in the group in response to what was occurring. One principal, in commenting on what was happening in a staff planning committee meeting said:

> I also want to mention that it's not up to me to focus the discussion. Often I sit back and become a participant, nothing more. People don't look to me necessarily on something like this to make a decision. They feel its just as much their responsibility and they will focus the discussion. There are things that the principal and the vice-principal do decide if there is not much to discuss, but at the staff planning committee, if it's a proposal or concept that is <u>really</u> the responsibility of the entire group, I back out as chairman and it just carries on itself.

Later in the meeting, the principal points out that he must play a different role:

> This is the principal talking. I have to talk about regulations. Now I'm not there as a participant but now I have to ask questions. She made a statement that I just couldn't let go. As a principal, I've got something I have to be responsible for.

The final sort of error regarding the inappropriate utilization of knowledge structures involves **using theories or schemas that do not represent reality very accurately**. The examples of inflexibility or error with respect to knowledge structures which we have outlined up to this point involve misapplication of particular schemas when the

more cautious or critical application of the same schemas would have served the principal quite well. Nisbett and Ross (1980) point out that there are particular schemas--particularly those involving sterotypes--which are "so lacking in foundation and predictive value that they almost invariably serve the user badly"(p. 40). There were a number of instances where principals made strong generalizations about their staff. For instance, one said "Teachers can't take complaints; they'll fall apart emotionally" while another said "Teachers don't like to open themselves up and have people come in to their classrooms."

Another suggestion of erroneous schemas came from the metaphors and analogies used by some principals. One regarded an educational system as analogous to a military organization, another referred to some students as "the cream" and others as "the dregs", and a third spoke of his staff as "my horses...I can't go anywhere without them".

Examples of more appropriate schemas came from principals who displayed a clear awareness of individual differences among staff members, of their competencies and circumstances at any time. One principal stated that "People move at their own rates, and all the research shows that you cannot get all of them up to level X at the same time." Another, in referring to a staff member who was experiencing some extreme personal stress, indicated that:

> There has to be a lot of understanding on my part and the staff's. We all have to be special with her. I don't treat everyone the same. Fairness is one thing, and consistency is another, but understanding is probably more important. We are different and we all have our own situations, and I think you have to work with that aspect.

This principal was aware not only of special needs of staff but also of their accomplishments, strengths, and philosophies of education; this was evident from a number of comments that he made also during the stimulated recall interview session.

Another category of statements were much more compatible with cognitive flexibility and provided a contrast with the inflexible stereotyping described earlier. These

included well-articulated beliefs or theories about the value of collective work in problem solving. Like the negative stereotype statements, these involved generalizations about all staff, but they were generalizations of a different quality. It seems plausible to suggest that principals who act on beliefs such as these will empower their staff members, increasing the possibility that most, if not all, will contribute to group problem solving. Principals who believe in the more negative generalizations ("Teachers should and want to do their own jobs, unassisted, and principals do too") seem likely, we speculate, to prevent even those individuals who are very interested in working on collective problem solving from doing so: their inflexibility may in a sense generate a self-fulfilling prophecy. Examples of the apparently more empowering beliefs are: "I have a strong belief that everyone has something to contribute. I believe in letting the person take the risk." and "I believe that people have a mindset toward doing things better. I make it clear to staff that if they can see a better way of doing things, let me know and my nose won't be out of joint."

Mood-related Inflexibility

Instances of inflexibility in the previous section were those primarily influenced by cognitive factors. Those described in this section were associated with more motivational influences.

There were several instances in which principals' moods produced considerable inflexibility and failure to examine alternative possible courses of action. In some cases, this led to poor choices of action. In one case, a principal decided to write letters rather than seeing an irate parent in person, a choice he later regretted "I didn't want to see him again...he kept harrassing me...continuing to put pressure on me...So I refused to see him in person."

In other cases, a concern with one's own mood and emotion has distracted the principal from more appropriate concerns and choices. One principal had a continuing concern

with his own emotional state throughout the interviews, and made a series of comments such as "I'm really not afraid of anyone, but I guess now I'm afraid of him", "I'd enter the situation with apprehension", "My stress level is pretty low, I have tremendous confidence, but if I have no solution, my stress level can really go up." Another principal repeatedly spoke of his "frustration" with the staff.

More appropriate strategies for dealing with mood influences were demonstrated by a considerable number of principals. As was the case for those concerned with not overweighting the vividness of certain information, a sense of perspective on problem solving appears to be helpful in avoiding emotions such as frustration. For example, "There are some problems you can't do anything about. They are just too massive. It may have taken years to get that way, so how are you going to turn that around in a few hours?"

A considerable number of principals were aware of the need to keep their moods under control in group problem solving: "You have to have a process where you can get people to air their concerns and then work through the concerns in a fashion that is as impersonal as possible."

A smaller number indicated awareness of the need to keep their own mood under control when solving a problem alone. One said:

> A principal has to be a person who doesn't panic particularly easily, because so many things can go wrong, nothing ever goes exactly as planned, no matter how careful...You have to keep thinking, all the while. That's one of the things that makes a good principal, one who can keep thinking and readjusting his or her thoughts as situations arise.

and another that:

> You have to know how to deal with things that are urgent and not panic, but use plans and click them in calmly. You know you don't have to solve any problems yourself

Part of the "more appropriate" approach involved approaching problems with an air of calm confidence. One principal described his style: "As my wife said, 'When a situation

arises, you don't seem to get all flustered...you are cool, don't get emotional." He went on to say:

> I don't worry so much as I used to...you know you can make a negative statement...I have enough self-confidence that I think it's better that I should speak up and say what I think than worry about whether someone will put an obstacle in my way.

Goal-related Flexibility: Responsiveness to Possibilities in Situation

In the previous sections, the instances which were clearest in the analysis and reporting were negative occurrences, indicators of cognitive inflexibility. In this section, the instances which are clearest are positive occurrences, indicators of cognitive flexibility.

Among certain principals, particularly in their remarks during the stimulated recall sessions, there were six very clear examples of a phenonemon which we termed (after Hayes-Roth and Hayes-Roth, 1979) "opportunistic planning", where the problem solver makes decisions that follow up on selected opportunities that present themselves in the situation, or "takes advantage of opportunities". For instance, one principal who was dealing with the problem of improving staff resources for disciplining students solved two other problems in the process. First, he became immediately aware, during the group discussion, that his vice-principal had a serious personal concern with some facets of the discipline situation and made it a deliberate point to discuss it with him alone very soon. Also, in considering the overall problem, he indicated the availability of a Ministry resource document for assisting with solutions and, while formulating a process for dealing with the discipline situation and introducing the document, he realized that the approach being developed would have great potential utility as a model for introducing the other documents which arrived in the school with great frequency.

In addition to these situations in which principals demonstrated specific strategies for taking advantage of an opportunity presented, some principals displayed an explicit awareness of interpreting problem situations as "opportunities". One pointed out the possibilities for "image building" in several hypothetical case problems and in several

problems that he had actually experienced.

This appears to be part of a more general vigilance on the part of some principals. Particularly when faced with unstructured or unclear situations, these principals look for those specific aspects of the situation which will allow them to meet their goals, especially those to do with staff and students. These principals have a number of goals in mind and are extremely responsive to the possibilities in any situation for meeting such goals, especially their most important goals. For instance, one principal said, "Whatever it is we do, it has to be based on whatever we're doing for kids. That belief helps me make decisions...When I look at a problem, one of the first questions I ask myself is 'How will this benefit students?'"

Evidence of unresponsiveness was of two sorts. First, in the stimulated recall interview, there were two very clear cases of "missed opportunities" which the researcher noticed (although the principal, listening also, did not). Second, there were several instances in which principals seemed to be so focussed on their own narrow goal that they were blind to any other possibilities in the situation. In contrast to a colleague who was well aware that a system which focussed too much on avoiding mistakes is one which will be inflexible and have poor solutions, one principal described his approach to problem solving as "I know what they will support. You follow policies and procedures set down." The most dramatic example of this narrowness and inflexibility occurred during a stimulated recall interview. The principal was so consumed with "getting his own way" in a decision that he failed almost entirely to hear the strong opposition of most staff. When he stated that he wanted to get "good" information, he meant that he wanted to get information that agreed with his. There were also cases in which the principal failed to be responsive to possibilities in the situation because of an absence of any clear goals at all.

Expert and Non-expert Patterns

The main purpose of this paper was to identify and illustrate instances of inflexibility and flexibility in the practices of school principals; it was not primarily to focus on comparisons between experts and non-experts in this domain. However, the marked differences in the patterns displayed by these two groups merits at least brief attention.

Before considering these results, it should be noted that only some of the principals in both the expert and non-expert groups were "good informants", while about half of the group, over all, made few statements indicative of either inflexibility or flexibility. In general, the "good informants" seemed to be at the extremes of the "expertness" distribution.

Among the expert group, four of the six principals clearly demonstrated a variety of instances of flexibility and the other two a smaller number of such instances; none of these six experts showed any instance of inflexibility. Among the non-expert group, five of the sixteen demonstrated a marked variety of instances of inflexibility and no instances of flexibility. Another nine of the non-expert principals demonstrated some instances of inflexibility and a very few instances of flexibility. Of the remaining two non-experts, one indicated no instances of inflexibility and a few of flexibility, while the other showed some inflexibility, but considerable attention to flexibility. That is, the data were clearest, most informative, and least inconsistent for the very expert and not-very-expert extremes.

In summary, experts avoided errors, controlled their moods, and were responsive to opportunities in the situation. Non-experts, at least those at the least effective extreme, made errors, were unable to control their mood, and were unresponsive to opportunities available in the problem setting.

Discussion

Our data indicate that there is a definite pattern, one displayed clearly by most of the expert group, of cognitive flexibility. In addition to supporting the work of Showers and Cantor (1985) and Nisbett and Ross (1980) which strongly influenced the design of our analysis, it verifies findings of other investigators in the fields of thinking and intelligence.

Our study indicates three main elements of flexibility. First, cognitive flexibility involves a total avoidance of cognitive errors and an ability, noted by many authors (e.g., Morine-Dershimer, 1986; Nisbett & Ross, 1980; Schön, 1983) to make very fine discriminations among details of particular situations. Second, cognitive flexibility involves controlling one's negative moods and approaching problem situations with an air of calm confidence. Klemp and McClelland (1986), in studying characteristics of intelligent functioning among managers, found that the "competency" of self-confidence was absolutely essential and served to drive the other intellectual competencies. Third, cognitive flexibility involves being responsive to the possibilities in the situation, affording a clear illustration of what Sternberg and Wagner (1986) would regard as "practical intelligence". These authors use Neisser's (1976) definition of "intelligent performance in natural settings...as responding appropriately in terms of one's long-range and short-range goals, given the actual facts of the situation as one discovers them."(p.137)

It should be noted that cognitive flexibility never involves what Bolman and Deal (1984) refer to as overresponsiveness or spinelessness. Expert principal problem solvers, we think from other data we have collected, have core principles, beliefs, and goals that are inviolate. That is, they display extreme cognitive flexibility, but they are always guided by a coherent philosophy of education (Begley, 1988; Leithwood & Stager, 1987).

Our results provide a full, but essentially static, picture of what constitutes cognitive flexibility in the principal's role. A major question raised by these results is: To what

extent can inflexibility be modified and flexibility encouraged? We are currently planning and pilot testing an experimental practicum to address this question. This practicum will focus on a number of general ideas and particular strategies that have considerable potential for increasing cognitive flexibility. In it, we will first try to promote an increased understanding of elements and sources of inflexibility and flexibility. Next, we will encourage increased vigilance--for dangers, for differences between new problem situations and similar ones in the past, and for a situation's possibilities for achieving one's goals. Finally, we will attempt to foster the understanding that cognitive flexibility will increase dramatically if two very fundamental approaches, observed in our earlier work (Leithwood & Stager, 1986, 1987) to characterize the expert problem solver, are taken. The first of these is the careful collection of information throughout all stages of the problem-solving process, including constantly checking that communication is clear and that people are operating on the same information. The second of these approaches is a strong demonstrated commitment to the collective process. Nisbett and Ross (1980) conclude from their extensive work on judgmental errors:

> ...the potential for collective inferential improvement may far outstrip the potential for individual improvement. We are likely to be better able to see the motes in our brothers' eyes than to see the beams in our own. (p. 291)

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